

improved to negate the need for dipping the forming material into water. The material can cure merely from a water spray, allowing for example spraying 18 gallons of water, rather than cure from dipping which conventionally requires 80 gallons of water. This improvement is made possible by modifying the compounding of the polyisocyanate and its polyol constituents to (a) contain terminal isocyanate radicals, and (b) limiting a total of isocyanate (NCO) radicals therein to about 1-5% by weight. The specification describes and illustrates a detrimental effect which occurs when the isocyanates present are free and the NCO radicals contained therein are more than 5% by weight, i.e. erratic urea bonding linking prepolymers to isocyanates and linking isocyanates to isocyanates. Consequently, a hard, fragile and tattered structure ensues, absent dipping into significantly more water. Also, if less than 1% NCO radical by weight is present, then a particularly high molecular weight polyol is required which causes an undesirably high viscosity during curing.

The Examiner has cited Hirano 6,027,777, as the primary reference. Although, the Hirano patent discloses the Applicant's earlier invention for this type of forming material, it calls for cure by dipping in water. The Examiner concedes that the Applicant's earlier Hirano patent does not disclose the hardness of the granular material nor does it discuss the critical 1-5 weight % NCO radical concentration of the present invention.

The Examiner cites Aoki as a supplemental reference because it teaches , at column 10, lines 10-17, that an NCO radical concentration range of 0.5 to 20% by weight is suitable for moisture-curable urethane prepolymers and presumably therefore suggest modifying Hirano so as to restrict NCO content to 1-5% and so as to cure with substantially less water. The Applicant respectfully disagrees.

The Aoki reference can not be said to fairly suggest or to implicitly teach one that Hirano, by limiting the isocyanate radical concentration could hasten curing. In fact, Aoki's teachings are *away from* the present invention. That is, Aoki teaches that higher concentrations of NCO such as 11.7% and 10.5% in Examples 1-13 have equally acceptable cures when compared to the prepolymers having terminal NCO radicals and concentrations as low as 1.9% and 1.7% by weight in Examples 14-23. According to Aoki at Comparative Example 1, column 23, lines 31-37, Comparative Example 2, column 25, lines 38-46, and Comparative Examples 3 and 4, column 27, lines 21-39, even if the terminal NCO radical content is reduced to as low as 1.9% or 1.7%, the curing rate becomes "very slow" unless a particular beta-amino-beta-propiolactam derivative is present. Pursuant to Comparative Example 2, even if a curing catalyst such as dibutyl tin dilaurate is substituted for the beta-amino-beta-propiolactam, the curing rate at Example 16 (with NCO radical content of 1.7%, column 23, line 48) is still "very slow."

Accordingly, the more fair interpretation of Aoki is that it teaches one who is curing water-curable materials, such as Hirano, that the curing rate could be increased by using beta-amino-beta-propiolactam derivatives as an adjunct to the polyisocyanate and/or polyurethane prepolymers having terminal isocyanate radicals, and that if Hirano merely adjusted the NCO content downward from 10-12% to 1-2% with terminal isocyanate radicals, without the beta adjunct there would be no difference in the rate of curing, i.e. it would remain "very slow."

In conclusion, the Applicant respectfully submits that Aoki fails to either mention or suggest modifying the prepolymer of Hirano to obtain a forming material that "effectively cures using a water spray" because Aoki teaches *negatively*, i.e. compounding the NCO radical at 1-5% would still cure "very slowly." At best, Aoki might suggest, although the Applicant does not

concede this, that it would be obvious-to-try a broad range of NCO radical concentrations down to as low as .5% and as high as 20%. However, "obviousness-to-try" is and has been a long standing improper standard of patentability. When picking and choosing only so much of the Aoki reference as to make this rejection, one overlooks Aoki's suggestion that "trying" different NCO concentrations makes no difference in hastening the very property which the Applicant desires to hasten, i.e. the *water cure*.

Wherefore, the Applicant respectfully request reconsideration of its claims 1-9 as being free of objection and as patentably distinct over the references of records.

Respectfully submitted

HAVERSTOCK, GARRETT & ROBERTS LLP

W. F. Foyles, Jr.

Veo Peoples, Jr.
Registration No. 27,048
Attorney for Applicant
St. Louis, Missouri 63101
(314) 241-4427

10 / 9 / 03